AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1   1. (Currently amended) A method that predicts a result produced by a

2   section of code in order to support speculative program execution, the section of

3   code including a plurality of program instructions, the method comprising:

4   executing the section of code within a program using a head thread,

5   wherein executing the section of code produces the result;

6   before the head thread produces the result, generating a predicted result to

7   be used in place of the result;

8   allowing a speculative thread to speculatively execute subsequent code

9   within the program using the predicted result, wherein the subsequent code

10   follows the section of code in an execution stream of the program; and

11   after the head thread finishes executing the section of code, determining if

12   a difference between the predicted result and the result generated by the head

13   thread affected execution of the speculative thread;

14   if the difference affected execution of the speculative thread, executing the

15   subsequent code again using the result generated by the head thread; and

16   if the difference did not affect execution of the speculative thread,

17   performing a join operation to merge state associated with the speculative thread

18   with state associated with the head thread;

19   wherein during a every write operation to a memory element by the head

20   thread, the write operation involves:

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21   performing the write operation to a primary version of the

22   memory element,

23   checking status information associated with the memory

24   element to determine if the memory element has been read by the

25   speculative thread,

26   if the memory element has been read by the speculative

27   thread, causing the speculative thread to roll back so that the

28   speculative thread can read a result of the write operation, and

29   if the memory element has not been read by the speculative

30   thread, performing the write operation to a space-time dimensioned

31   version of the memory element if the space-time dimensioned

32   version exists; and

33   wherein performing the join operation involves merging the space-time

34 dimensioned version of the memory element into the primary version of the

35 memory element and discarding the space-time dimensioned version of the

36 memory element.

1   2. (Original) The method of claim 1, wherein executing the subsequent

2 code again involves performing a rollback operation for the speculative thread to

3 undo actions performed by the speculative thread.

1   3. (Original) The method of claim 1, wherein determining if the difference

2 affected execution of the speculative thread involves determining if the

3 speculative thread accessed the predicted result.

1   4. (Original) The method of claim 1, wherein determining if the difference

2 affected execution of the speculative thread involves determining if the predicted

3 result differs from the result generated by the head thread.

1   5. (Original) The method of claim 1, wherein generating the predicted
2 result involves looking up a value based upon a program counter for the program.

1   6. (Original) The method of claim 5, wherein generating the predicted
2 result involves additionally looking up the value based upon at least one
3 previously generated value for the result.

1   7. (Original) The method of claim 5, wherein generating the predicted
2 result involves performing a function on the value.

1   8. (Original) The method of claim 1, wherein executing the section of code
2 involves performing one of:
3   a method invocation to execute the section of code;
4   a function call to execute the section of code; and
5   a procedure call to execute the section of code.

1   9. (Original) The method of claim 1, wherein the section of code is a body
2 of a loop in the program, and the result is a loop carried dependency for the loop.

1   10-11 (Canceled).

1   12. (Currently amended) An apparatus that facilitates predicting a result
2 produced by a section of code in order to support speculative program execution,
3 the section of code including a plurality of program instructions, the apparatus
4 comprising:
5   a head thread that is configured to execute the section of code within a
6 program, wherein executing the section of code produces the result;

7   a prediction mechanism that is configured to generate a predicted result to

8   be used in place of the result before the head thread produces the result;

9   a speculative thread that is configured to speculatively execute subsequent

10   code within the program using the predicted result, wherein the subsequent code

11   follows the section of code in an execution stream of the program;

12   a determination mechanism that is configured to determine <u>during every</u>

13   <u>write operation</u> if a difference between the predicted result and the result

14   generated by the head thread affected execution of the speculative thread; and

15   a joining mechanism that is configured to merge state associated with the

16   speculative thread with state associated with the head thread if the difference did

17   not affect execution of the speculative thread, wherein the joining mechanism is

18   configured to:

19   merge the space-time dimensioned version of the memory

20   element into the primary version of the memory element, and to

21   discard the space-time dimensioned version of the memory

22   element; and

23   a mechanism that performs write operations for the head thread, the

24   mechanism being configured to:

25   perform a write operation to a primary version of a memory

26   element,

27   check status information associated with the memory

28   element to determine if the memory element has been read by the

29   speculative thread,

30   cause the speculative thread to roll back so that the

31   speculative thread can read a result of the write operation if the

32   memory element has been read by the speculative thread, and

33   perform the write operation to a space-time dimensioned

34   version of the memory element if the space-time dimensioned

35   version exists and if the memory element has not been read by the

36   speculative thread;

37   wherein if the difference affected execution of the speculative thread, the

38   apparatus is configured to execute the subsequent code again using the result

39   generated by the head thread.

1   13. (Original) The apparatus of claim 12, wherein while executing the

2   subsequent code again, the apparatus is configured to perform a rollback operation

3   for the speculative thread to undo actions performed by the speculative thread.

1   14. (Original) The apparatus of claim 12, wherein the determination

2   mechanism is configured to determine if the speculative thread accessed the

3   predicted result.

1   15. (Original) The apparatus of claim 12, wherein the determination

2   mechanism is configured to determine if the predicted result differs from the

3   result generated by the head thread.

1   16. (Original) The apparatus of claim 12, wherein the prediction

2   mechanism is configured to generate the predicted result by looking up a value

3   based upon a program counter for the program.

1   17. (Original) The apparatus of claim 16, wherein the prediction

2   mechanism is configured to generate the predicted result by additionally looking

3   up the value based upon at least one previously generated value for the result.

1   18. (Original) The apparatus of claim 16, wherein the prediction

2 mechanism is configured to generate the predicted result by performing a function

3 on the value.

1   19. (Original) The apparatus of claim 12, wherein the section of code

2 includes one of, a method, a function and a procedure.

1   20. (Original) The apparatus of claim 12, wherein the section of code is a

2 body of a loop in the program, and the result is a loop carried dependency for the

3 loop.

1   21-22 (Canceled).

1   23. (Currently amended) A computer-readable storage medium storing

2 instructions that when executed by a computer cause the computer to perform a

3 method that predicts a result produced by a section of code in order to support

4 speculative program execution, the section of code including a plurality of

5 program instructions, the method comprising:

6   executing the section of code within a program using a head thread,

7 wherein executing the section of code produces the result;

8   before the head thread produces the result, generating a predicted result to

9 be used in place of the result;

10   allowing a speculative thread to speculatively execute subsequent code

11 within the program using the predicted result, wherein the subsequent code

12 follows the section of code in an execution stream of the program; and

13   after the head thread finishes executing the section of code, determining if

14 a difference between the predicted result and the result generated by the head

15 thread affected execution of the speculative thread;

16   if the difference affected execution of the speculative thread, executing the

17   subsequent code again using the result generated by the head thread; and

18   if the difference did not affect execution of the speculative thread,

19   performing a join operation to merge state associated with the speculative thread

20   with state associated with the head thread;

21   wherein during a-every write operation to a memory element by the head

22   thread, the write operation involves:

23   performing the write operation to a primary version of the

24   memory element,

25   checking status information associated with the memory

26   element to determine if the memory element has been read by the

27   speculative thread,

28   if the memory element has been read by the speculative

29   thread, causing the speculative thread to roll back so that the

30   speculative thread can read a result of the write operation, and

31   if the memory element has not been read by the speculative

32   thread, performing the write operation to a space-time dimensioned

33   version of the memory element if the space-time dimensioned

34   version exists; and

35   wherein performing the join operation involves merging the space-time

36   dimensioned version of the memory element into the primary version of the

37   memory element and discarding the space-time dimensioned version of the

38   memory element.

1   24. (Original) The computer-readable storage medium of claim 23,

2   wherein executing the subsequent code again involves performing a rollback

3   operation for the speculative thread to undo actions performed by the speculative

4   thread.

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